Alice Yeh/R2/USEPA/US
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To lisa.baron, Edward Demarest, Anne.hayton, TJI, tim_kubiak, otto, Clay_Stern
cc reyhan.mehran, Tom.Brosnan, Scott.R.Nicholson, Peter.M.Weppler, llevine, debbie, Nace.Charles, richardsonN, gunster, sthompson, Mindy Pensak, Marian Olsen, Elizabeth Butler, lwarner, BFidler, "Beauchemin, Melissa A", "Gulbransen, Tom", "Bonnevie, Nancy", barrowse, Elizabeth.A.Buckrucker, RCalifano
bcc
Subject BERA Workshop Materials (2 of 3)

Attached are materials in preparation for the BERA Workshop on Dec 13-14, to be held at EPA's Edison NJ lab. In this second of three e-mails, I have attached the presentation that we will use to guide the discussion. You will be receiving 1 more e-mails from me with additional materials.

BERA Workshop - Passaic River - FINAL.ppt

I will be out of the office from 12/2 through 12/11, returning on 12/12. So if you have any questions about the BERA Workshop, please call Chuck Nace of EPA at 212-637-4164.

Hard copies of the workshop materials are being compiled into a binder that will be mailed next week to the following people who have confirmed that they would be coming:
Lisa Baron, Ed Demarest, Anne Hayton, Tim Iannuzzi, Tim Kubiak, Bill Potter, Clay Stern

If you would like to receive the hard copy binder, please CALL Chuck Nace at the above number to let him know (he may also need your mailing address). Please do not e-mail me or call me because I will not be here to receive your request.


Day 1
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Passaic River: Baseline Ecological Risk Assessment Workshop

December 13 and 14, 2005
USEPA Edison Facility
Conference Room #2 – Regional Response Center
Edison, NY
[12/01/05 Version]

Agenda

1. Welcome and Introductions
2. Workshop Objectives
3. Identification of COPECs
4. Conceptual Site Model
   a. Environmental Fate and Effects of COPECs
   b. Key Exposure Pathways
   c. Ecological Receptors Potentially at Risk
5. Management Goals and Risk Hypotheses
6. Assessment Endpoints
7. Measurement Endpoints
8. Summary of Meeting Proceedings

Welcome and Introductions

- Circulate sign-in sheet
- Everyone introduce themselves
- This symbol  and yellow text indicates that a straw proposal is being presented for discussion and to reach consensus on the specific issue

Ecological Risk Assessment

- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) authorizes USEPA to protect public health and the environment
- USEPA's primary regulation in Superfund is the National Contingency Plan (NCP)
  - Identification and mitigation of environmental impacts, and
  - Selection of remedial actions to protect the environment

Ecological Risk Assessment

- Evaluation of environment impacts are addressed though conducting an ecological risk assessment using current agency guidance
  - Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments – EPA 540-R-97-006
- USEPA guidance follows an eight-step process with Steps 1 and 2 typically associated with screening-level assessment (SLERA) and Steps 3-8 typically associated with baseline assessment (BERA)

Ecological Risk Assessment

- Steps 1 and 2 have been evaluated for portions of the Passaic River in the following documents
  - Pathways Analysis Report for Lower Passaic River Restoration Project – USEPA/USACE/Battelle, July 2005
  - Ecological Risk Assessment Exposure and Toxicity Assessment Framework for the Passaic River Study Area – BBL, May 2002
  - Screening-level Human Health and Ecological Risk Assessment for the Passaic River Study Area, Volume I, Draft Report – ChemRisk 1995
  - New York/New Jersey Harbor Estuary Program Module 3:1 Toxics Characterization Report – Squibb et. al. 1991

Ecological Risk Assessment

- The result of previous screening evaluations have indicated a need to conduct a baseline ecological risk assessment (BERA)
- Focus of this workshop is to refine information presented in the screening evaluations, discuss technical issues associated with Steps 3 through 8 of the BERA, and develop a consensus approach for conducting the BERA

Goals and Objectives

- To refine the list of chemicals of potential ecological concern (COPECs) in the lower Passaic River
- To refine the conceptual site model that links sources and receptors
  - To reach consensus on the environmental fate and effects of the selected COPECs
  - To refine key exposure pathways
  - To refine ecological receptors
- To focus the risk hypotheses regarding the potential effects of COPECs
- To refine the assessment and measurements endpoints for the BERA

Identification of COPECs

- Several lists of COPECs have been developed in the screening-level assessments
  - The two most recent have identified a total of ~110 compounds, with ~70 compounds being identified in both
- Issue 1 - The most significant differences were associated with grouping compounds by class
- Issue 2 – Refining list to focus on the primary compounds associated with risk

Identification of COPECs

Issue 1

- PAHs – Individual identification or by weight
- PCBs – Arolcors or congeners
- Pesticides – Individual (e.g., DDD, DDE, DDT) or total (e.g., ΣDDT)
- Dioxin – 2,3,7,8-TCDD or all dioxin/furan congeners

Identification of COPECs

- Propose standard grouping for PAHs, PCBs, pesticides and dioxins –
  - use individual PAHs (34) and sum by weight for assessment,
  - use both a subset of congeners and Aroclor data for PCBs,
  - sum pesticide analogs (e.g., endrin, endrin ketone = total endrin), and
  - include all dioxin/furan congeners with TEQ analysis

Identification of COPECs

Issue 2

- Select methodology to focus COPEC list to those compounds that are the primary risk drivers
- Factors to consider:
  - Hazard quotients with refined assumptions
  - Exposure point concentration adjustment
  - Bioavailability
  - Background comparison

Identification of COPECs

- Methodology to use for refining COPECs (see flow chart in handouts)
  - Screen the maximum concentration
  - Consider detection frequency (5%)
  - Consideration of background for inorganics
  - Dose calculation using realistic parameters
  - Compare dose calculation to PCL
    - PCL = wildlife protective concentration level; will be derived based on realistic assumptions appropriate for the BERA (e.g., receptor-specific foraging frequency, chemical-specific bioavailability)

Break

Please be back in 15 minutes

Conceptual Site Model

- A conceptual site model (CSM) is a basic description of how contaminants enter a system, how they are transported within the system, and where routes of exposure to organisms (and humans) occur. As such, it provides an essential framework for assessing risks from contaminants, developing remedial strategies, determining source control requirements, and how to address unacceptable risks.
- Characterize environment, identify sources, transport mechanisms, environmental fate, exposure routes, and receptors

Conceptual Site Model

- Large river system that transitions from freshwater to an estuarine system
  - Affect transport and fate, as well as receptors
- Various inputs to the system and contaminant sink(s) in the system
  - Affect transport and fate
- Limited resources to collect data
  - Affect all areas of the CSM
- Combine environmental characteristics, historic data, and current data to develop the CSM – modeling useful for this step

Overview of Modeling Program

- Hydrodynamic model
  - Simulates flow of water in estuary system as input parameter to sediment transport model
- Sediment Transport model
  - Provides for movement of sediments to which contaminants bind
- Fate and Transport model
  - Provides concentrations of organic carbon and contaminants as input for food web model
- Food web model
  - Provides tissue concentration for invertebrates (benthic and crustacean), and fish (forage and predatory)

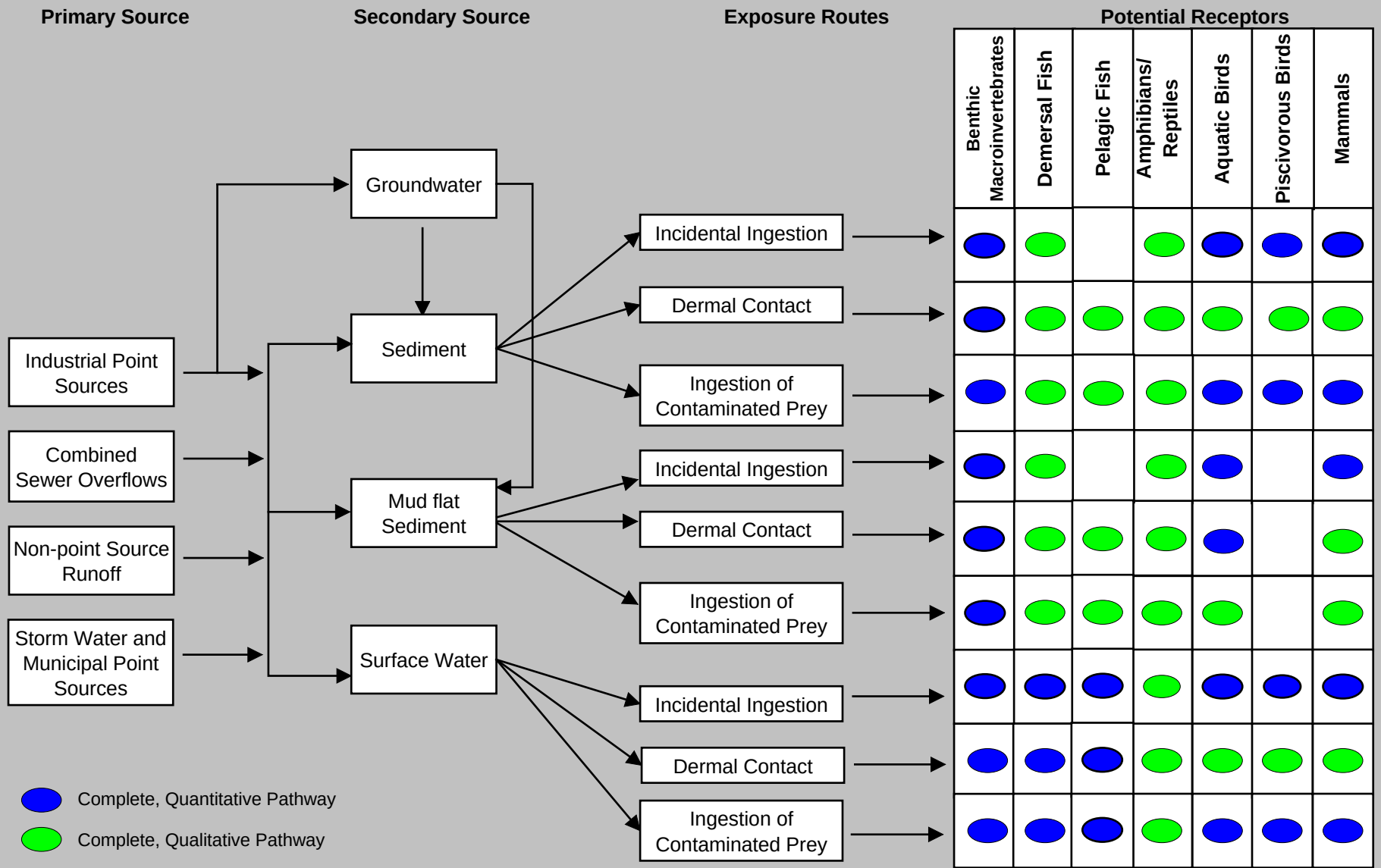
Overview of Modeling Program

- Model uses:
  - Projection (e.g., what will fish concentrations be at some point in time)
  - Evaluation of remedial options (e.g., what will fish concentrations be if remedial option X is completed?)
  - Use output of models in risk assessment to estimate risk and to evaluate assessment and/or measurement endpoints

Overview of Modeling Program

- Limitations and Customizing for our needs
  - Pathways
    - Limited to sediment and aquatic inhabitants
  - Contaminant availability, biology and habitat
  - Number and type of species/trophic levels
    - Due to computational resources there is a limit on the number and type of species that can be modeled
  - Number and type of contaminants
    - Due to computational resources there is a limit on the number and type of contaminants that can be modeled
  - Spatial and functional limitations
    - Hot spots, average over wide area, etc.

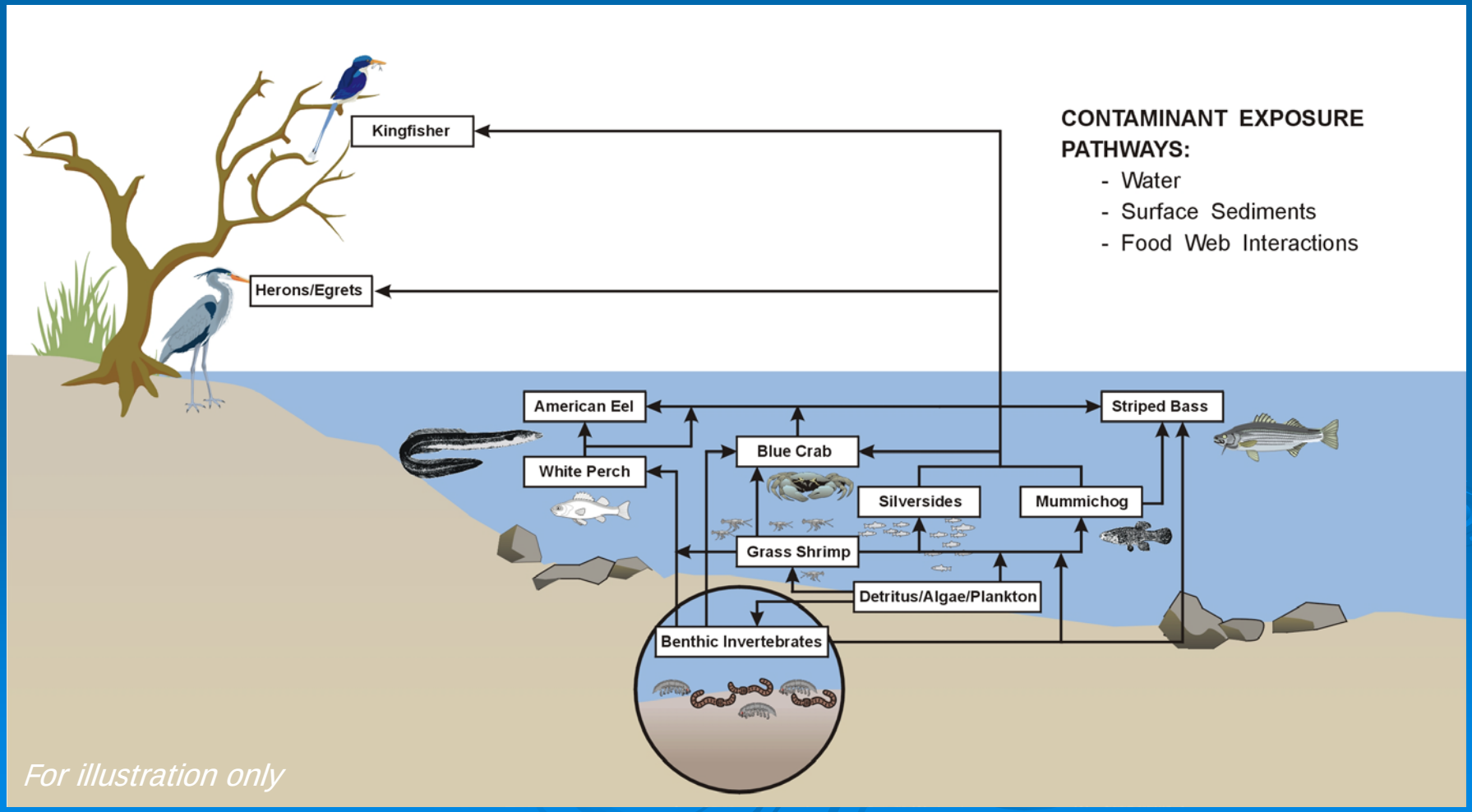
Preliminary Conceptual Site Model



USEPA Pathway Analysis Report (2005)

Conceptual Site Model

- Food web CSM further defines relationships between environment and biota



Lunch

Please be back at 1:30

Key Exposure Pathways

- Exposure pathways that have been identified in previous reports represent the same media
  - Sediment
  - Surface water
  - Biota
- Other issues to consider
  - Non-chemical stressors
  - Terrestrial and wetland habitats

Key Exposure Pathways

- Sediment
- Mud flats
- Surface water
- Biota
  - Invertebrates
  - Fish
  - Birds
  - Mammals

Community Groups

- Community Groups that are or should be in the study area may include (see table):
  - Microbial
  - Plant
    - Phytoplankton
    - Periphyton
    - Aquatic - Macrophytes
  - Invertebrate
    - Zooplankton
    - Benthic
    - Crustaceans
    - Mollusks
  - Fish
    - Forage
    - Predatory
  - Amphibians
  - Reptiles
  - Birds
    - Benthivorous
    - Piscivorous
    - Omnivorous
    - Insectivorous
  - Mammals
    - Piscivorous
    - Omnivorous
    - Insectivorous

Community Groups

- Propose:
  - Plant
    - Aquatic - macrophyte
  - Invertebrate
    - Benthic
    - Crustacean
  - Fish
    - Forage
    - Predatory
  - Amphibians
  - Birds
    - Benthivorous
    - Piscivorous
    - Omnivorous
  - Mammals
    - Piscivorous
    - Omnivorous

Break

Please be back in 15 minutes

Ecological Receptors

- Selection of representative species for each community group that was previously selected
- Should meet one or more of the following criteria:
  - Sensitive species
  - Species that have wealth of toxicity data
  - Species that have tissue data available or can be readily sampled
  - Species that inhabit or have a high likelihood of inhabiting the area
  - Species of importance to human consumers

Ecological Receptors

Community Group	Candidate Focal Species	
	USEPA 2005	BBL 2002
Primary consumer	Benthic macroinvertebrate	Benthic invertebrate (polychaete/oligochaete)
Omnivorous crustacean	Blue crab	Grass shrimp and blue crab
Forage fish	Mummichog	Mummichog and Atlantic silverside
Predatory fish	American eel, striped bass, carp, channel catfish	Striped bass, American eel, and white perch
Piscivorous bird	Black-crowned night heron, American bittern, Snowy egret	Herons, egrets and belted kingfisher
Omnivorous bird	Ducks/geese	None listed
Reptile	To be determined	None listed
Amphibian	To be determined	None listed
Mammalian	River otter	None listed

- Comparison of exposure pathways from two reports

Ecological Receptors

Community Group	Propose
Plant – aquatic (macrophyte)	*Spartina alterniflora*
Invertebrate – benthic	*Ampelisca abdita* (amphipod)
Invertebrate - crustacean	Blue crab
Forage fish	Mummichog
Predatory fish	American eel, striped bass, largemouth bass, channel catfish
Amphibian	Bullfrog
Benthivorous bird(s)	Greater yellowlegs, black-crowned night heron
Piscivorous bird(s)	Cormorant, snowy egret
Omnivorous bird(s)	Mallard duck, Canada goose
Piscivorous mammal(s)	River otter, weasel
Omnivorous mammal	Raccoon

Conceptual Site Model

- Workgroup should revise the conceptual site model to include the pathways and ecological receptors that were agreed upon during the discussion period

Problem Formulation

- Management goals

A Fishable, Swimmable River

- Remediate Contaminated Sediments
- Improve Water Quality
- Restore Degraded Shorelines
- Restore and Create New Habitats
- Enhance Human Use

Problem Formulation

- Fundamental Questions for the Study:
  - If we take no action on the River, when will contaminants of concern recover to acceptable concentrations?
  - What actions can we take on the River to significantly shorten the time required to achieve acceptable concentrations for hum & ecol health?
  - Are there contaminated sediments now buried that are likely to become exposed following a major flood, possibly resulting in an increase in contaminants in the biota of the River?
  - What actions can we take on the River to significantly improve the functionality of the Lower Passaic River watershed?
  - If the risk assessments for Newark Bay demonstrate unacceptable risks due to contaminant export from the Passaic River, will the plan proposed for the River significantly shorten the time required to achieve acceptable conc.'s in the Bay, or will additional actions be required on the River?
  - What actions can we take on the River to significantly reduce the cost of dredged material management for the navigational dredging program?
  - What actions can we take to restore injured resources and compensate the public for their lost use?

Summary – Day 1

- We have focused our list of COPECs
- We have revised the CSM to focus on exposure pathways and receptors of interest
- We have begun to discuss the questions that need to be answered…tomorrow we will focus on assessment endpoints and measurement endpoints


Day 2
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Assessment Endpoints

- Identified as “an explicit expression of the environmental value that is to be protected”
- Focus on particular components of the ecosystem that could be adversely affected by contaminants from the site
  - typically related to the pathways and receptor groups identified in the CSM
- Once selected, testable hypotheses and measurement endpoints can be developed to determine whether or not a potential threat to the assessment endpoints exits

Measurement Endpoints

- Identified as “a measurable ecological characteristic that is related to the valued characteristic chosen as the assessment endpoint”
- Is a measure of biological effects (e.g., mortality, reproduction, growth)
- Frequently numeric expressions of observations that can be statistically compared to a control or reference site
- May want to pursue more than one line of evidence to identify site-specific thresholds for effects

Measurement Endpoints

- A variety of measurement endpoints were identified in the USEPA 2005 Pathways Analysis Report, such as:
  - Comparing sediment/surface water/tissue concentrations to toxicity-based screening values
  - Conducting *in situ* and/or laboratory toxicity testing
  - Conducting field-based surveys and community assessments
  - Comparing incidence of gross and/or histopathological lesions in study area to reference area

Measurement Endpoints

- Measurement endpoints are quite varied and are dependant upon the specific assessment endpoint that is identified
- Important that the selected measurement endpoint provides adequate data to satisfy the assessment endpoint

Measurement Endpoints

- Workgroup should focus efforts on developing a list of assessment and associated measurement endpoints for each receptor group that was identified in the previous section
- Try to get consensus on assessment and measurement endpoints – move to flip chart

Assessment Endpoint # 1

- Aquatic plants - macrophyte (emergent)

- Workgroup draft one statement for consensus, if appropriate, and develop measurement endpoint

Assessment Endpoint #2

- Benthic Invertebrates
  - Survival and maintenance of a normally functioning benthic invertebrate community (BBL)
  - Protection and maintenance (i.e., survival, growth, and reproduction) of benthic invertebrate communities that serve as a forage base for fish and wildlife populations (USEPA)
- Workgroup draft one statement for consensus, if appropriate, and develop measurement endpoint

Assessment Endpoint #3

- Macroinvertebrate (Crustacean)
  - Survival and maintenance of healthy, reproducing populations of blue crab (BBL)

- Workgroup draft one statement for consensus, if appropriate, and develop measurement endpoint

Assessment Endpoint #4

- Forage Fish
  - Survival and maintenance of healthy, reproducing populations of fish (BBL)
  - Protection and maintenance (i.e., survival, growth, and reproduction) of dermersal, benthivorous fish populations that serve as a forage base for fish and wildlife populations (USEPA)
- Workgroup draft one statement for consensus, if appropriate, and develop measurement endpoint

Assessment Endpoint #5

- Predatory Fish

- Workgroup draft one statement for consensus, if appropriate, and develop measurement endpoint

Break

Please be back in 15 minutes

Assessment Endpoint #6

- Amphibian

- Workgroup draft one statement for consensus, if appropriate, and develop measurement endpoint

Assessment Endpoint #7

- Benthivorous Bird

- Workgroup draft one statement for consensus, if appropriate, and develop measurement endpoint

Assessment Endpoint #8

- Piscivorous Bird
  - Survival and maintenance of healthy, reproducing populations of piscivorous birds (BBL)
  - Protection and maintenance (i.e., survival, growth, and reproduction) of piscivorous bird populations (USEPA)
- Workgroup draft one statement for consensus, if appropriate, and develop measurement endpoint

Assessment Endpoint #9

- Omnivorous Bird
  - Protection and maintenance (i.e., survival, growth, and reproduction) of omnivorous bird populations (USEPA)

- Workgroup draft one statement for consensus, if appropriate, and develop measurement endpoint

Assessment Endpoint #10

- Piscivorous Mammal
  - Protection and maintenance (i.e., survival, growth, and reproduction) of piscivorous mammal populations (USEPA)

- Workgroup draft one statement for consensus, if appropriate, and develop measurement endpoint

Assessment Endpoint #11

- Omnivorous Mammal

- Workgroup draft one statement for consensus, if appropriate, and develop measurement endpoint

Lunch

Please be back at 1:30

Workshop Summary

Workshop Summary

Workshop Summary

Next Steps

- Begin work on the BERA
  - Document the discussions from this workshop, in conjunction with the PAR, to finalize Steps 1 through 3
  - Update the field sampling plan to address concerns (Step 4) and implement
  - Analyze data and complete the remaining steps of the BERA

Adjourn